

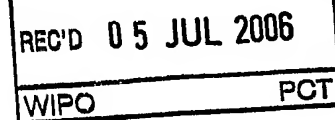
PATENT COOPERATION TREATY


PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 2005M014		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/EP2005/000946		International filing date (day/month/year) 28.01.2005		Priority date (day/month/year) 22.03.2004
International Patent Classification (IPC) or national classification and IPC INV. C10G3/00				
Applicant EXXONMOBIL CHEMICAL PATENTS INC.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 23.01.2006		Date of completion of this report 04.07.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer Bertin-van Bommel, S Telephone No. +31 70 340-4231		



**INTERNATIONAL PRELIMINARY REPORT
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-35 as originally filed

Claims, Numbers

1-18 received on 25.01.2006 with letter of 23.01.2006

Drawings, Sheets

1/2, 2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application,
☒ claims Nos. 11

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*).
- ☒ no international search report has been established for the said claims Nos. 11
- ☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:
- ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.
- ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.
- ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b) and 13*ter*.2.
- ☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it.
- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.
- ☐ See separate sheet for further details

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	8,10
	No: Claims	1-7,9,11-18
Inventive step (IS)	Yes: Claims	
	No: Claims	1-18
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and /or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

No Search Report has been established for the amended claim 11 ("*DME in amount of 250 ppm to ...*"). Therefore, in accordance with Rule 66.1(e), an international preliminary examination will be performed on the claim as filed originally.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

- D1: WO 03/033441 A (SHUTT JOHN R ; LAUERMANN GERHARD (DE); FRITZ HELMUT (DE); KUNKEL JOSEF) 24 April 2003 (2003-04-24)
- D2: US 2002/103406 A1 (MATHYS GEORGES ET AL) 1 August 2002 (2002-08-01)
- D3: BELLER M, ET AL: "Progress in hydroformylation and carbonylation" JOURNAL OF MOLECULAR CATALYSIS. A, CHEMICAL., vol. 104, 1995, pages 17-85, XP002325577 NLELSEVIER, AMSTERDAM.
- D4: US-A-5 960 643 (KUECHLER ET AL) 5 October 1999 (1999-10-05)

Novelty

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 is not new in the sense of Article 33(2) PCT.

The document D1 discloses a method of making aldehydes comprising contacting an oxygenate with a molecular sieve catalyst to form an olefin composition; separating a propylene containing stream from the olefin composition and using said propylene to manufacture aldehydes (see D1: claim 1; § [0118]).

Although the term hydroformylation is not employed explicitly in D1, it is generally known

to the person skilled in the art that in order to obtain aldehydes from propylene, one could contact the propylene with a rhodium hydroformylation catalyst in order to obtain the hydroformylated product, i.e. the aldehydes, see for instance document D3, page 48, section 2.4.2.2, first paragraph. As D1 clearly suggest the production of aldehydes from propylene, and one well-known method is by hydroformylation over a rhodium catalyst, this feature is considered to be implicitly included in D1, which is consequently prejudicial to the novelty of claim 1.

3. The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claim 9, which therefore is also considered not new.

Moreover, the term "obtained by" as formulated in claim 9 is considered to be interpretable as "obtainable by" as the claim concerns the use of a product *per se*, which product is the same whether obtained by one process or by the other. D3 is therefore also considered to be prejudicial to the novelty of claim 9 as it unambiguously discloses the use of propylene for the production of butyraldehyde, even if it stays silent on how the propylene is obtained.

It is noted that if the applicant considers there to be a difference in the product as obtained by an oxygenate to olefin process, which gives rise to an unexpected effect or property, a feature reflecting this difference should be indicated in the claim.

4. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 11 is not new in the sense of Article 33(2) PCT.

D1 discloses a propylene composition comprising propylene, water, propane and dimethyl ether (DME), i.e., comprising no ethylene, wherein the amount of DME in the propylene stream, after removal of water and propane, is 0.5-25 wppm.

5. The additional subject-matter of dependent claims 2-7, 12-18 is disclosed in D1 and therefore also not novel (see D1: corresponding passages cited in the search report).

Inventive Step

6. The present application does not meet the criteria of Article 33(1) PCT, because the

subject-matter of claims 1 and 9 do not involve an inventive step in the sense of Article 33(3) PCT.

Documents D2 and D3

7.1 The document D2 discloses a method of making a hydroformylated product comprising producing propylene from an oxygenate, separating the propylene, contacting the propylene with an oligomerisation catalyst to form a dimer or oligomer, and contacting the latter with a hydroformylating catalyst to form a hydroformylated product.

The problem to be solved in D2 is the same as the problem of the present application, namely, eliminating the need for extensive pretreatment of the olefin feed to remove contaminants, as is required from olefin feedstocks produced by cracking.

The subject-matter of claim 1 differs from the known method of D2 in that it includes the extra step of converting the propylene to an oligomer, before hydroformylation, rather than contacting the propylene directly with the hydroformylation catalyst.

7.2 Document D3, referred to in D2 (see D2: §[0063]) and thereby incorporated therein, discloses however the hydroformylation of propylene, by contacting propylene directly with a rhodium catalyst in order to produce butyraldehyde (see D3: p.32, reaction (4)).

It would therefore be obvious to the person skilled in the art, namely when the same result is to be achieved (e.g. the production of butyraldehyde) to eliminate the oligomerisation step of D2 and contact the propylene directly with the hydroformylation catalyst, as according to D3, thereby arriving at a method according to claim 1.

8. Regarding claim 9 and in addition to what has been mentioned under item 3 above, it is mentioned that obtaining propylene by a conversion of oxygenates to olefins is a well known process and no inventive step can therefore be recognised for the addition of such a feature.

Document D4

9. D4 discloses a method according to claim 1, comprising converting an oxygenate to

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ethylene, separating the ethylene and contacting it with a rhodium hydroformylation catalyst.

Claim 1 differs over D4 in that ethylene is produced and converted, instead of propylene. It is however generally known to the person skilled in the art that with the same process of document D4 the production of propylene is an equivalent to the production of ethylene and can be interchanged with that feature where circumstances make it desirable.

10. The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claim 9, which therefore is also considered not inventive.

11. Dependent claims 2-8,10,12-18 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, as these features are disclosed in D2, D3 and/or D4 (see the corresponding passages cited in the search report).

Re Item VI

Certain documents cited

Certain published documents

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US 2004/254416 A1	16.12.2004	16.06.2003	16.06.2003

CLAIMS

1. A method of making a hydroformylated product comprising contacting an oxygenate with a molecular sieve catalyst to form an olefin composition;
5 separating a propylene containing stream from the olefin composition and contacting the propylene containing stream with a rhodium hydroformylation catalyst to form a hydroformylated product.
2. The method according to claim 1 wherein the propylene containing stream
10 contains at least 50 wt % propylene, not greater than 10 ppb by weight of sulfur calculated on an atomic basis, and at least 100 ppb by weight of dimethyl ether.
3. The method of claim 1 or 2 wherein the propylene containing stream contains at least 60 wt % propylene.
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4. The method of claim 3, wherein the propylene containing stream contains at least 96 wt % propylene.
5. The method of any of the preceding claims, wherein the propylene
20 containing stream contains 100 ppb to 50000 ppm by weight of dimethyl ether.
6. The method of claim 5 wherein the propylene containing stream contains from 100 ppb to 5000 ppm by weight of dimethyl ether.
- 25 7. The method of any of claims 1 to 4 wherein the propylene containing stream contains from 2.5 to 25000 ppm by volume of dimethyl ether.
8. The method of any of the preceding claims, wherein the propylene containing stream is contacted with the rhodium hydroformylation catalyst at a
30 pressure of from 0.05 to 50 MPag.
9. The use of a propylene containing stream obtained by the conversion of

oxygenates to olefins in a hydroformylation reaction to produce butyraldehyde.

10. The use according to claim 9 in which the hydroformylation reaction is rhodium catalysed.

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11. A propylene composition comprising propylene, less than 5 weight percent ethylene based on the weight of the total composition and dimethyl ether (DME) in an amount of from about 250 ppm by weight up to 50000 ppm by volume based on the total composition.

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12. The composition according to claim 11 which comprises up to 25000 vppm DME.

13. The composition according to claim 12 which comprises up to 5000 vppm DME.

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14. The composition according to any of claims 11 to 13 which comprises less than 1 weight percent ethylene.

15. The composition according to claim 14 which comprises less than 15 vppm ethylene.

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16. The composition according to any of claims 11 to 15 which comprises at least 96 weight percent propylene.

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17. The composition according to any of claims 11 to 16 obtainable by a process for the conversion of oxygenates to olefins.

18. The composition according to any of claims 11 to 17 which contains not greater than 10 ppb by weight of sulfur calculated on an atomic basis.

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